Massachusetts Institute of Technology
Instrumentation Laboratory
Cambridge, Massachusetts

LUMINARY Memo # 42

To: Distribution

From: George W. Cherry

Subject: LUMINARY Program Changes suggested at the MSC/MIT Lunar Landing Coordination Meeting held at MIT on 9/12/68.

The consensus of opinion was that one-phase targetting offered operational and trajectory advantages in certain respects. Only one disadvantage of one phase targetting was identified: namely, that the flight path angle did not become steeper than the sun angle until later in the trajectory. (The lunar surface detail is "washed out" when the sun angle is steeper than the flight path angle). The single very telling advantage of one phase landings over two phase landings was the elimination of the "rough ride"—— attitude command jerkiness —— and extra RCS activity prior to hi-gate which exists in the two phase approach.

The consensus at the meeting was also that we should modify the landing programs in such a way that we could use one phase targetting (no hi-gate) or two phase targetting (hi-gate intermediate targetting)—— provided this flexibility of retaining the two phase targetting does not impact the schedule for coding and checking out one phase guidance. The retention of the old two phase capability is understood not to be a requirement.

List of MIT/IL Proposed Changes which Implement the MSC PCR*

1. Retain the hi- and lo- gate targets in separate eraseables. (Alan Klumpp pointed out that by putting in somewhat different target conditions for hi-gate and lo-gate the trajectory could be additionally shaped for the one-phase targetting scheme).

2. Provide radial acceleration allocation flexibility by a switch which tells the thrust vector orientation routine to allocate the full guidance

* A copy of the one phase guidance logic PCR is attached.

commanded desired acceleration along the radius vector or, as presently coded, command the thrust vector along the desired total direction.

3. Use the ascent guidance thrust acceleration magnitude filter to smooth the noisy measured thrust acceleration so that desired radial acceleration allocation during FTP operation won't cause jerky guidance commands. (This is important to insure that the trim gimbal control system can maintain vehicle control during breaking without RCS jet aid).

4. Provide a switch to bypass linear guidance in P63 during one piece landings.

5. P64 is selected from P63 by comparison of TGO with a number stored in the LGC. Move this comparison number into eraseable.

6. Provide a new extended verb by means of which the astronaut can set the above comparison number to POSMAX causing P64 and its associated displays and LPD capability to begin within two seconds after the astronauts request.

7. No landing radar navigation weighting function change is required by the attached PCR.

8. The landing radar re-position command will be determined by geometry rather than time. This will allow the landing radar to be re-positioned on a logical rather than a chronological basis and allow the selection of P64 to be selected at the optimum point to bring in P64 displays, and LPD capability.

Attendees

J. H. Alphin	MSC/MPAD
B. A. Kriegsman	MIT
D. E. Gustafson	MIT
Eyles	MIT
Allan Klumpp	MIT
Clint Tillman	GAEC
Richard Labrecque	MPAD/MSC
F. V. Bennett	MPAD/MSC
G. Levine	MIT
G. Cherry	MIT
T. Price	FSD/MSC

cc: Attendees plus

Norm Sears	Neil Armstrong
Robert Covelli	William Widnall
Jim Kernan	William Marscher
Craig Schulenberg	Ed Copps
Kenneth Cox	Dave Hoag
Thomas Gibson	Richard Battin